



FEMA *Kentucky*
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North Elkhorn Risk MAP Early Demonstration Project

Products Overview Meeting
Wednesday, January 5, 2011
2:00 p.m.

Agenda

- Review from Last Meeting
 - Project Goals
 - Project Overview
- Flood Risk Products
 - HAZUS Risk Assessment
- Introduction to Areas of Mitigation Interest
- Data Collection and Discussion
- Questions

FEMA Funded Projects in Lexington

- Risk Map
- Updates to Hazard Mitigation Plan (grant application submitted)
- North Elkhorn Early Demonstration Project



Project Goals

- Identify Stakeholders
- Identify Flood Hazards
- Conduct Risk Assessment
- Plan for Hazards
- Identify Mitigation Alternatives
- Communicate Risk



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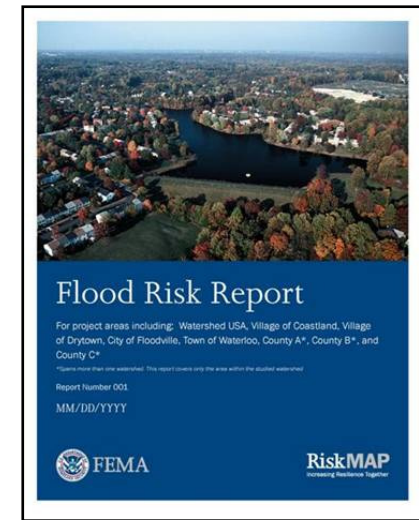
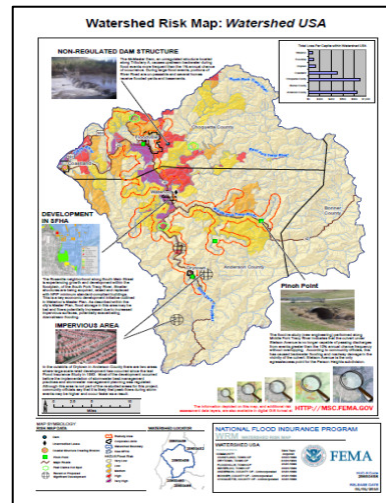
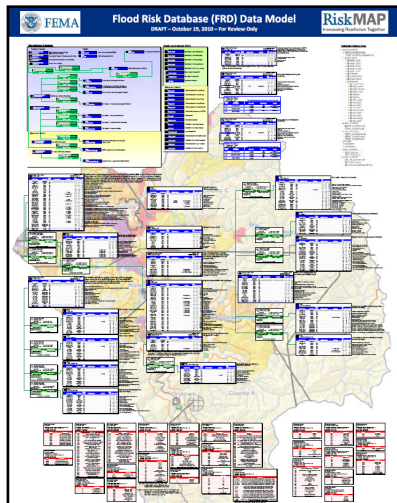
Why We're Here

- Flood risk changes over time
- We chose this watershed to assess due to risk and significant development in the watershed
 - Currently doing flood studies in watershed
 - Continuation of ongoing process in Fayette County
- A complete, current picture of your flood hazards and risks will help you better:
 - Plan for the risk
 - Take action to protect your communities
 - Communicate the risk to your citizens



Flood Risk *Products*

- Flood risk ***Database***
- Flood risk ***Map*** (*generalized flood risk data*)
- Flood risk ***Report*** (*flood risk data summaries*)

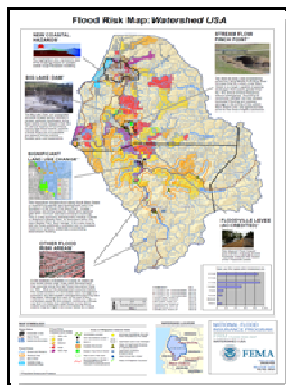


Flood Risk *Datasets*

1. Changes since last FIRM
2. Multi Frequency Flood Depth grids
Flood Risk Analysis Grids
3. HAZUS Flood Risk Assessment
4. Areas of Mitigation Interest



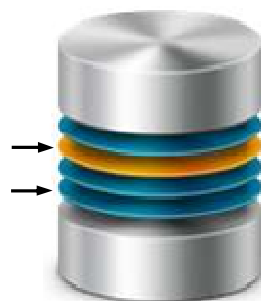
Flood Risk *Datasets & Products*



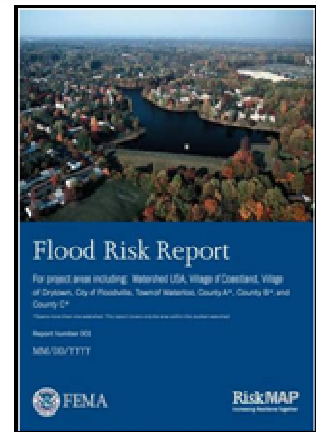
Flood Risk Map

Flood Depth & Analysis Grids
Flood Risk Assessment Data

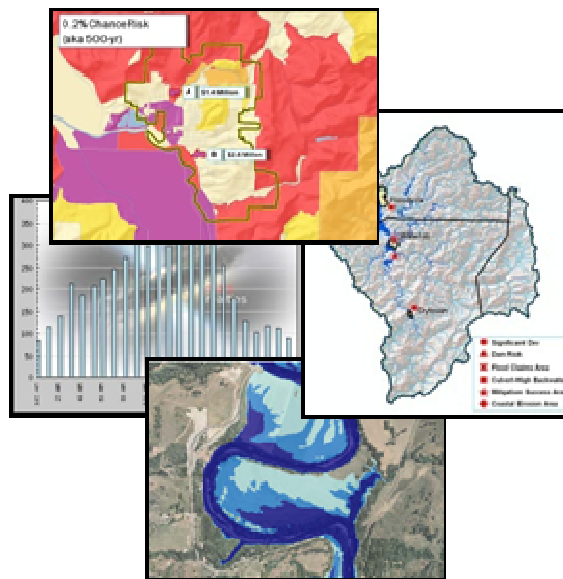
Flood Risk Database



Changes Since Last FIRM Data
Areas of Mitigation Interest Data



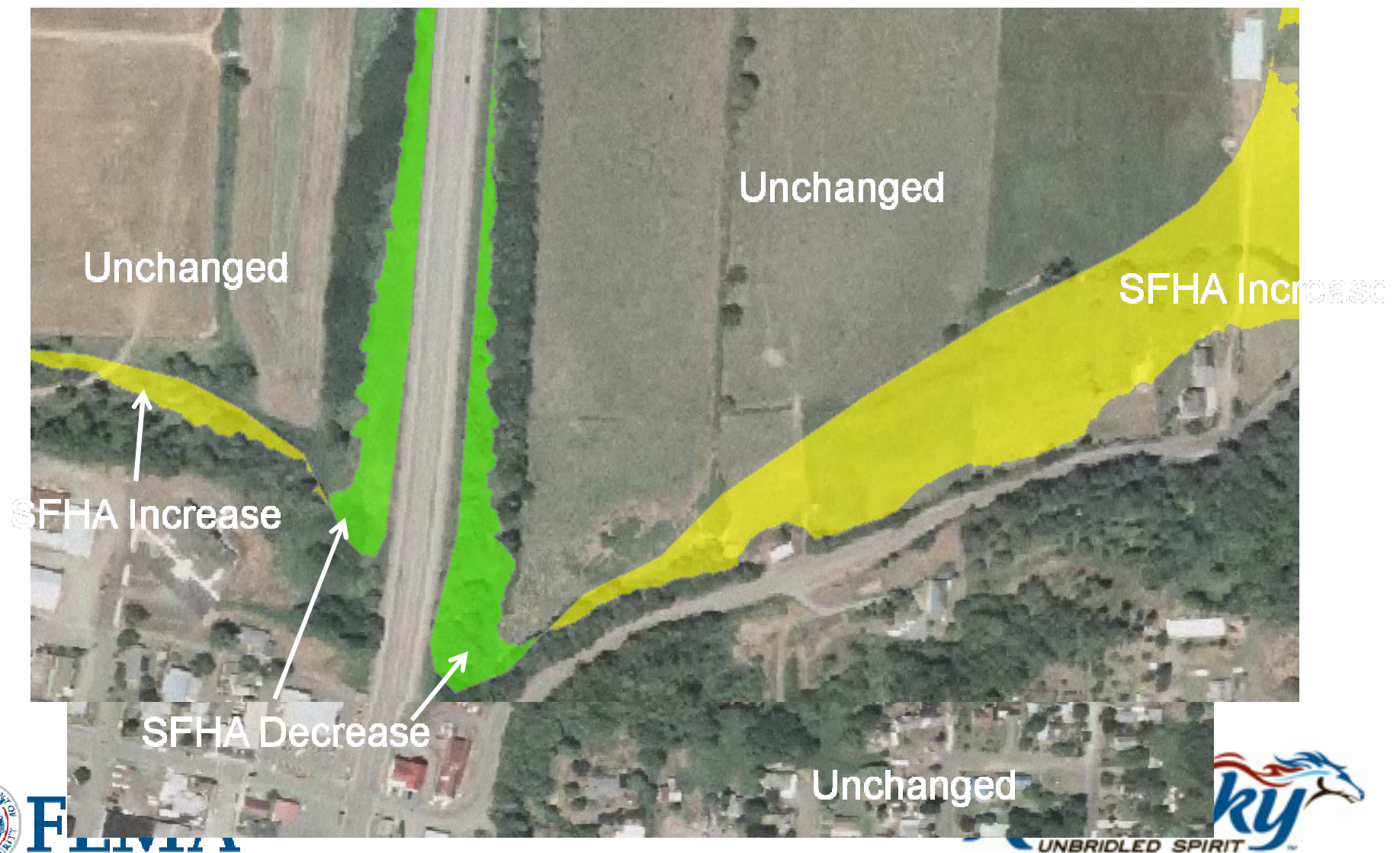
Flood Risk Report



Ad-Hoc Flood Risk Analysis & Visualization



1. Changes since last FIRM



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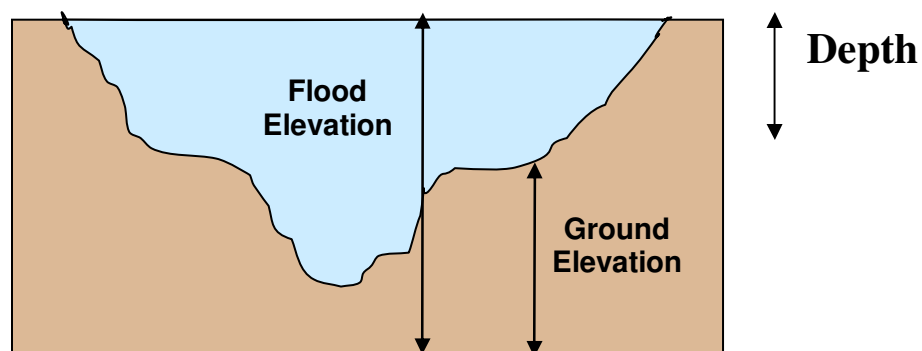


1. Changes since last FIRM

- Spatial change in the revised floodplain since the effective floodplain
- Identify reason for the change in floodplain
- Contributing engineering factors that influence floodplain extent change
 - New culvert
 - New discharges
 - New Terrain data (LiDAR)
 - etc...

2. Multi Frequency Flood Depth grids

- Enable quantification of potential flood losses as well as visualization and communication of flood risks for mitigation planning and emergency management
- $[Water\ Surface] - [Ground] = Depth$

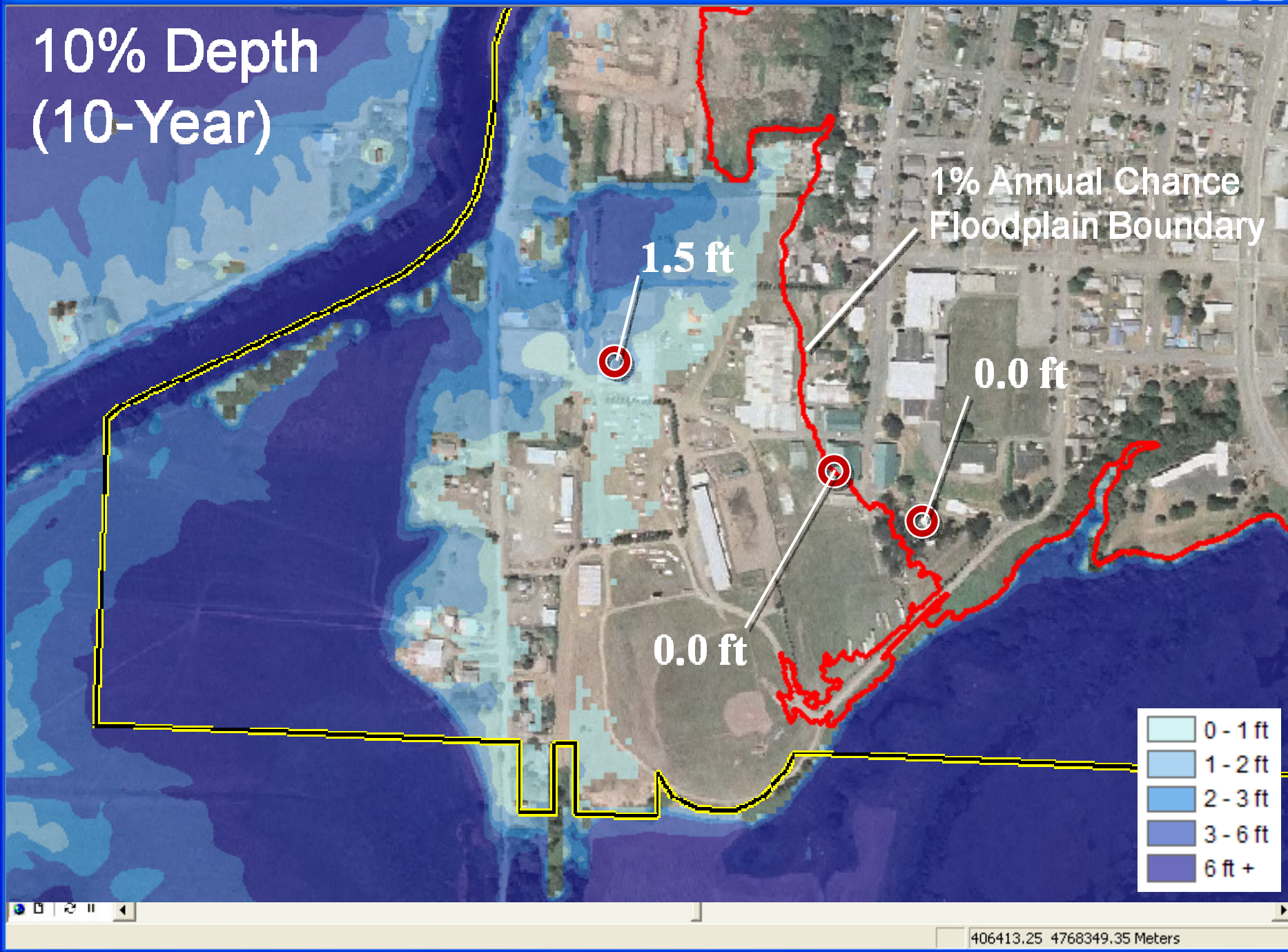


- Riverine: 10%, 4%, 2%, 1%, & 0.2% annual chance flood depth grids
- Annualized depth grid

2. Multi Frequency Flood Depth grids

- Raster grid containing values in each grid cell
- Subtract the ground elevation value from the water surface elevation value for each return period computed
- Each cell represents flood depths for specified return interval i.e. 10%, 4%, 2%, 1% and 0.2% frequency events (or 10, 25, 50, 100, 500 yr return periods)

10% Depth (10-Year)

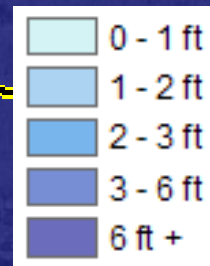


4% Depth (25-Year)

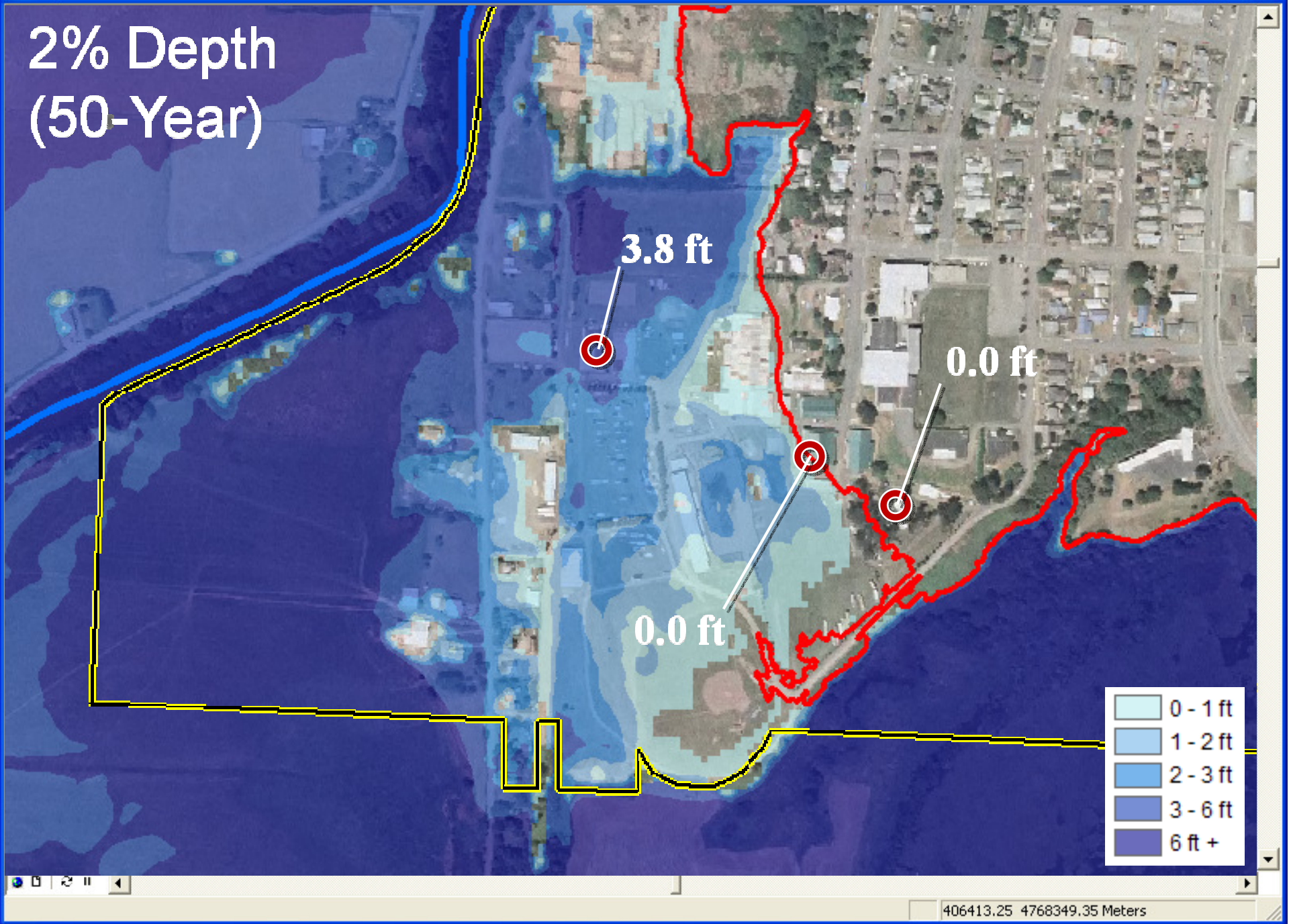
2.8 ft

0.0 ft

0.0 ft



2% Depth (50-Year)



1% Depth (100-Year)

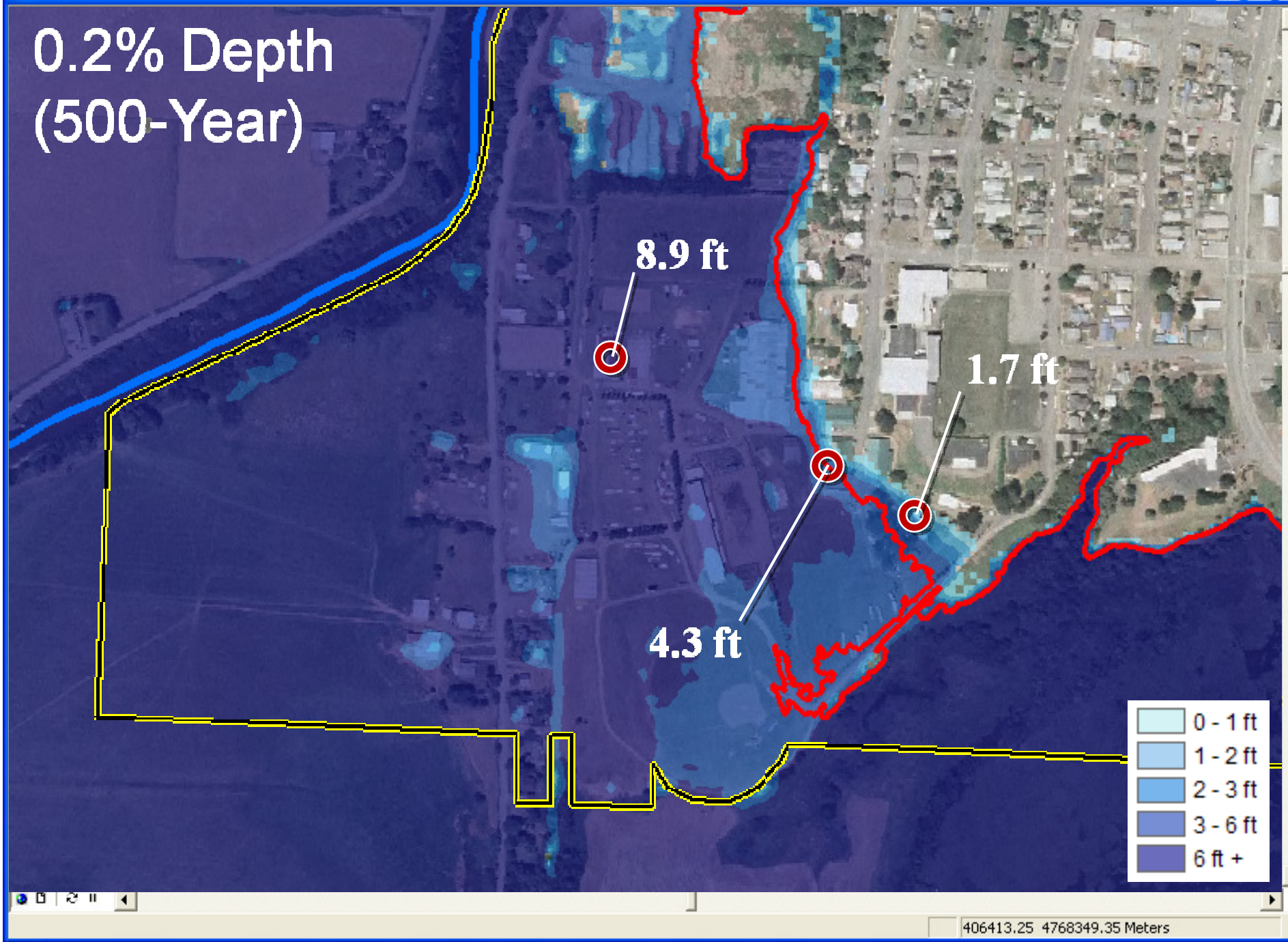
4.7 ft

0.0 ft

0.1 ft



0.2% Depth (500-Year)



Annualized Depth Grid

- Average annualized flood depth calculated using the five multi-frequency flood depth grids
- Can be used for pre-screening areas of high risk and mitigation potential.

- ***Annualized Depth =***

$$\begin{aligned} & (P10 - P25) * EXP\{[(LN(Depth10) + (LN(Depth25)]/2\} + \\ & (P25 - P50) * EXP\{[(LN(Depth25) + (LN(Depth50)]/2\} + \\ & (P50 - P100) * EXP\{[(LN(Depth50) + (LN(Depth100)]/2\} + \\ & (P100 - P500) * EXP\{[(LN(Depth100) + (LN(Depth500)]/2\} + \\ & P500 * Depth500 \end{aligned}$$

Where: PN = 1/N and represents the annual probability of an N-return period event; e.g., P10 is Probability of the 10 year or mathematically expresses as 1/10 = 0.1.

Flood Risk Analysis Grids

- WSEL change Grid
 - Vertical change companion to CSLF dataset
- Percent Annual Chance Grid
 - Annual probability of flooding
- Percent 30 year Chance Grid
 - Related to a 30 year mortgage



3. HAZUS Flood Risk Assessment

- HAZUS AAL study
 - FEMA conducted country-wide Level 1 analysis in late 2009
 - Maximum potential losses for a given year (10, 50, 100, 200, 500yr return periods)
- Refined (updated) HAZUS analysis using:
 - Updated Terrain data (LiDAR)
 - Updated H&H analysis
 - Updated GBS / population data
- Refined analysis will supplement the AAL results
- AAL and Refined are combined to form a “Composite” dataset.
- This data is used to populate Flood Risk Report and Flood Risk Map



HAZUS Process

- **Build a study area**
 - By State
 - By County
 - By Census Tract
 - By Census Block
- **Define Hazard**
 - Flood (Riverine / Coastal)
 - Hurricane
 - Earthquake
- **Import user data**
 - Terrain
 - Depth Grid
 - HEC-RAS Grid
- **Overlay Inventory**
 - Building Stock
 - Essential Facilities
 - High Potential Loss Facilities
 - Emergency Facilities
 - Transportation
 - Utility
- **Run HAZUS Calculations**
- **Estimate Losses**
 - Quick Look
 - Annualized Losses
 - Global Summary Report
- **Print Reports**
 - Tables
 - Maps

Refined Analysis Process

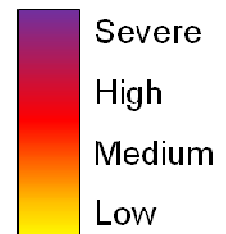
- Import user-defined depth grids
- Run HAZUS loss calculations
- Export loss results from HAZUS
- Derive flood risk database fields

10% Chance Risk (10-yr)

A
\$370,000

B
\$670,000

Flood Risk

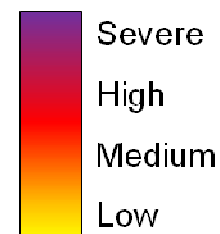


4% Chance Risk (25-yr)

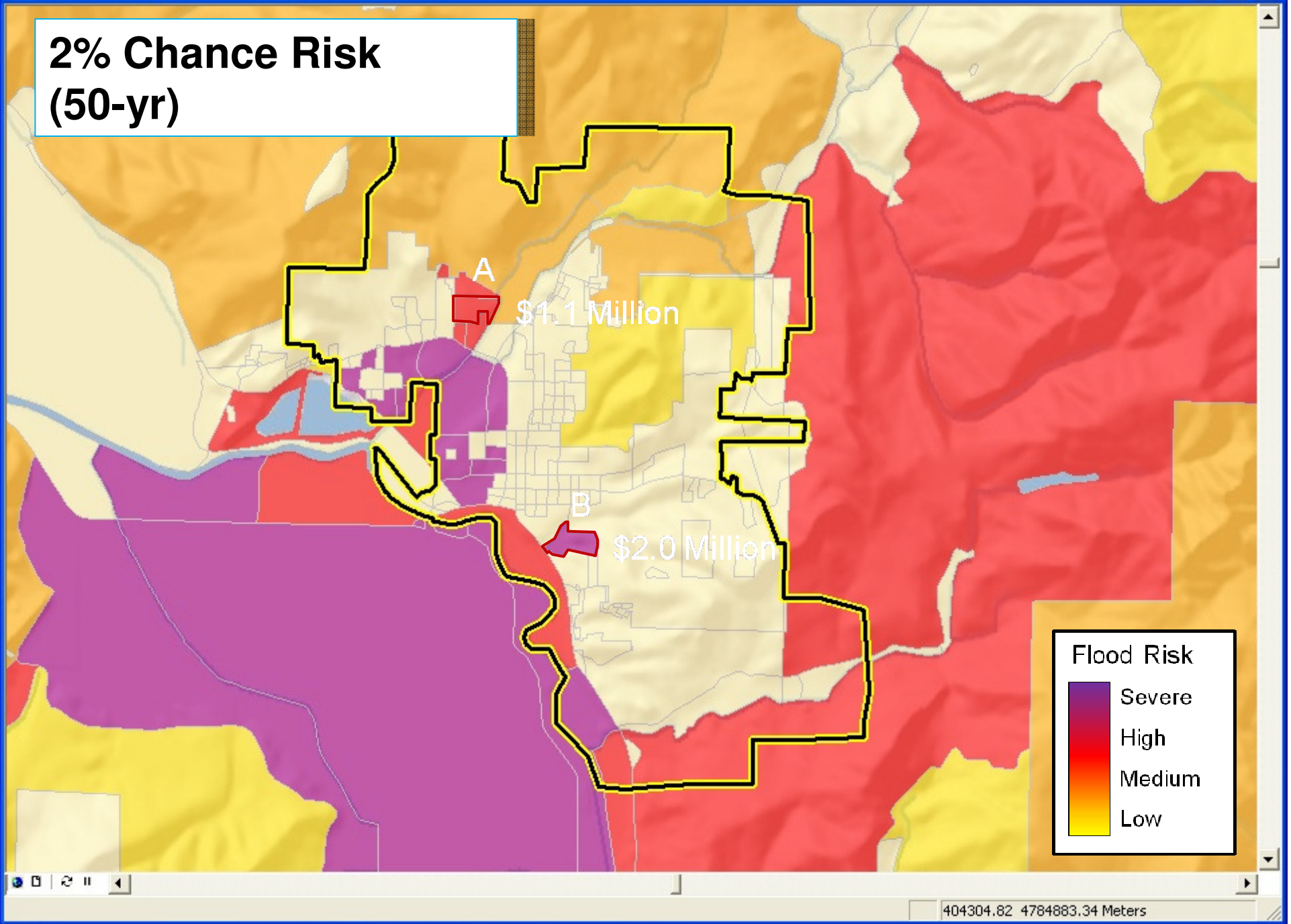
A
\$870,000

B
\$1.6 Million

Flood Risk



2% Chance Risk (50-yr)

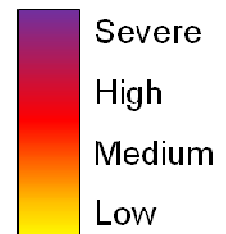


1% Chance Risk (100-yr)

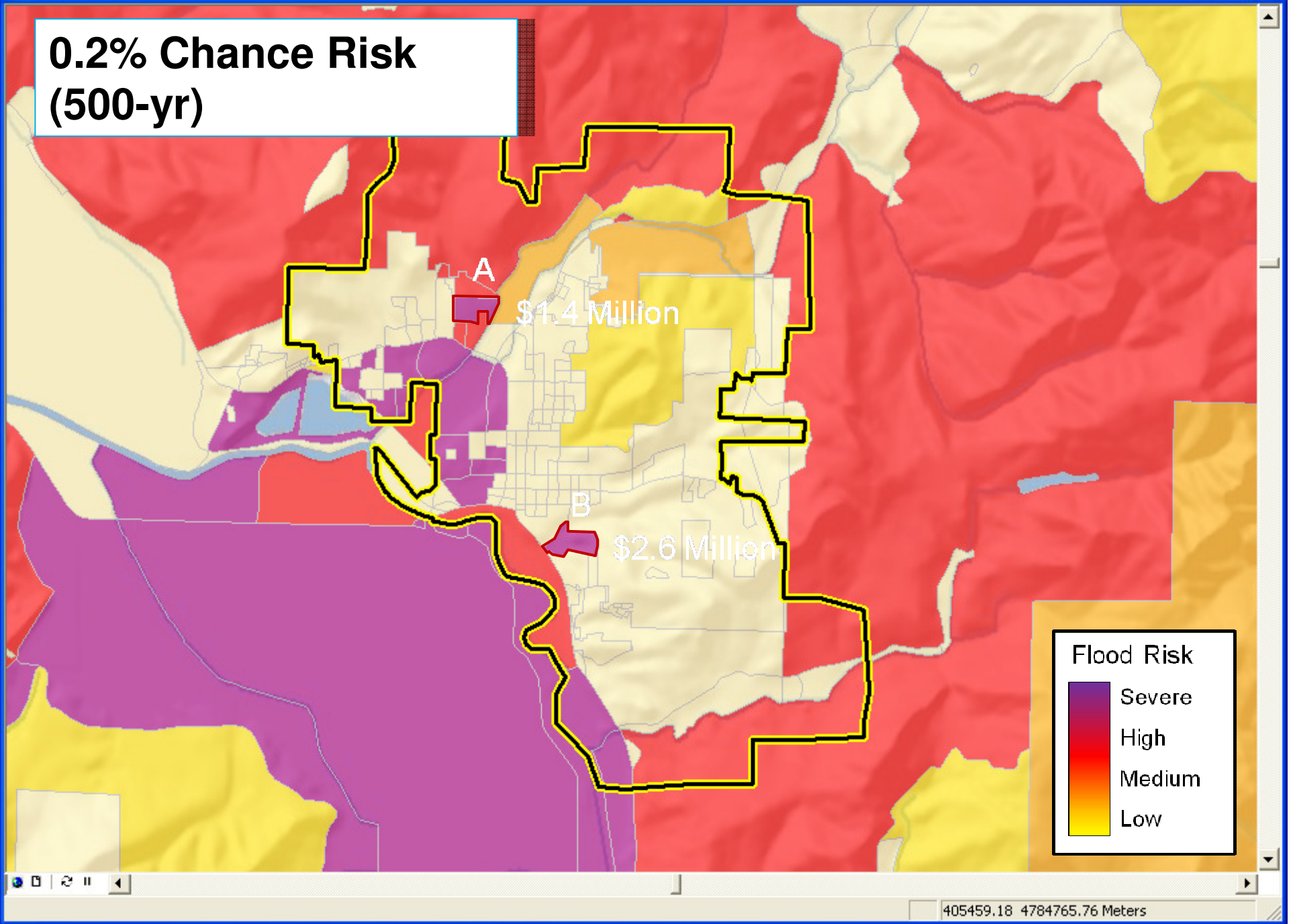
A
\$1.3 Million

B
\$2.4 Million

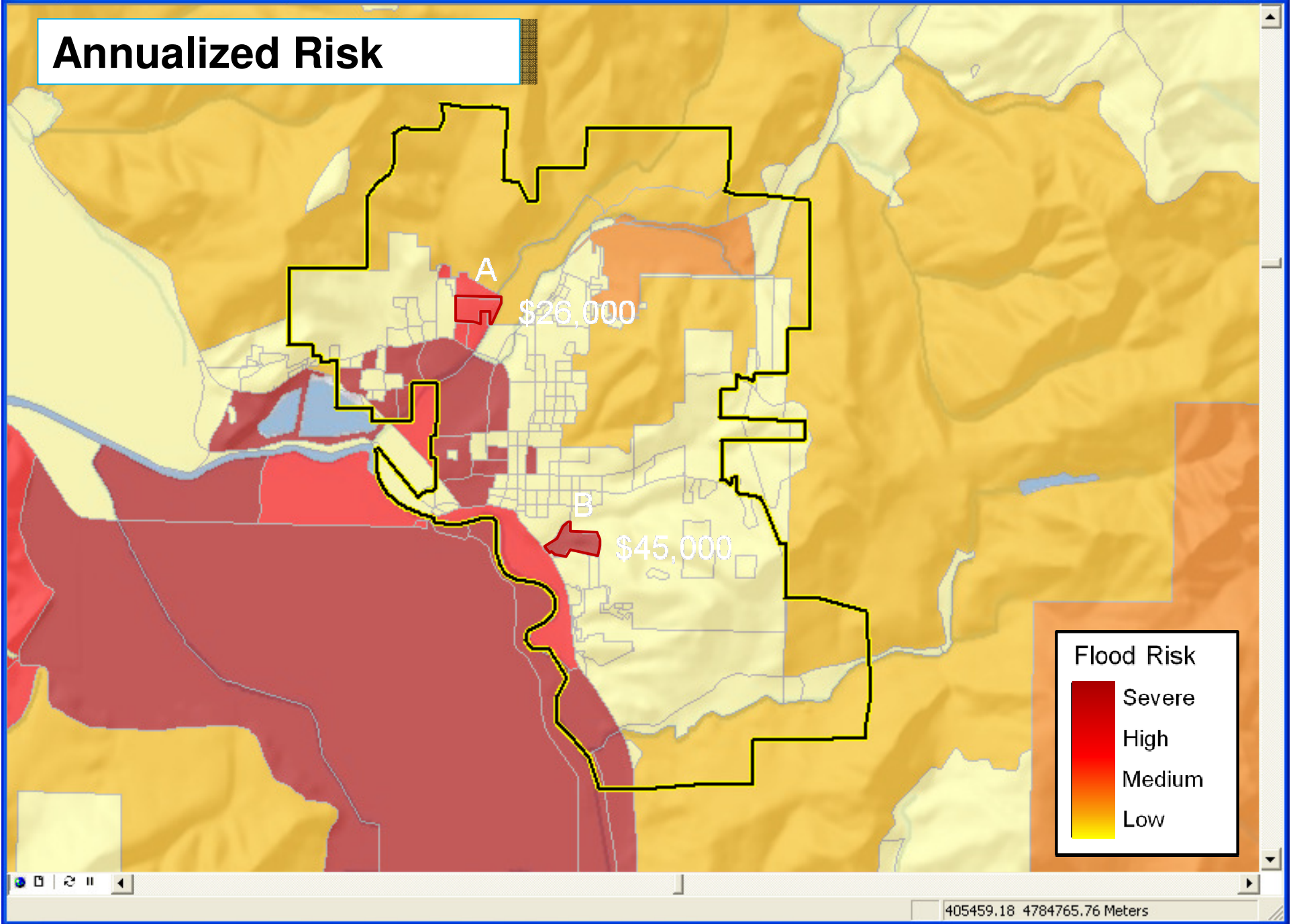
Flood Risk



0.2% Chance Risk (500-yr)



Annualized Risk



Flood Risk *Report*

- Types of risks analyzed:
 - Changes since last FIRM
 - Water Surface, flood depth and analysis grids
 - HAZUS Estimated loss Information
 - Areas of Mitigation Interest
- Types of loss estimations:
 - Residential Asset loss
 - Commercial Asset loss
 - Essential Facility loss
 - Infrastructure
 - Business Disruption
 - Annualized losses

Community provided data

- Location of successful mitigation projects
- Areas of significant erosion
- Significant recent or proposed development / land use changes in the SFHA
- High risk essential facility
- Community stormwater / drainage flooding 'hot spots'

Risk Communication

- Citizens look to local officials to keep them informed of flood risk
- Regular communication is important regarding:
 - Flood hazard and risk information
 - Steps they can take to protect their families and property
- Risk MAP provides information to help you communicate about flood risk, including:
 - Flood risk products written in plain English
 - Template for a community outreach plan
 - Draft letter to citizens
 - Media materials related to flood risk



FEMA Funding Opportunities

Eligible Activities	HMGP	PDM	FMA	RFC	SRL
1. Mitigation Projects	√	√	√	√	√
Property Acquisition and Structure Demolition	√	√	√	√	√
Property Acquisition and Structure Relocation	√	√	√	√	√
Structure Elevation	√	√	√	√	√
Mitigation Reconstruction					√
Dry Floodproofing of Historic Residential Structures	√	√	√	√	√
Dry Floodproofing of Non-residential Structures	√	√	√	√	
Minor Localized Flood Reduction Projects	√	√	√	√	√
Structural Retrofitting of Existing Buildings	√	√			
Non-structural Retrofitting of Existing Buildings and Facilities	√	√			
Safe Room Construction	√	√			
Infrastructure Retrofit	√	√			
Soil Stabilization	√	√			
Wildfire Mitigation	√	√			
Post-Disaster Code Enforcement	√				
5% Initiative Projects	√				
2. Hazard Mitigation Planning	√	√	√		
3. Management Costs	√	√	√	√	√



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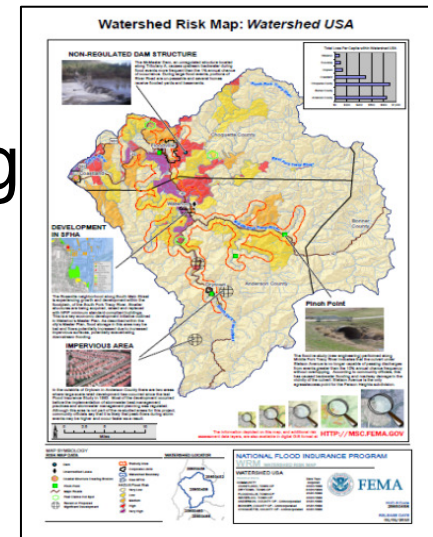
Types of Mitigation Projects

- Preventative Measures
- Property Protection Measures
- Natural Resource Protection Activities
- Emergency Services Measures
- Structural Mitigation Projects
- Public Education and Awareness Activities



Areas of Mitigation Interest

- Stream flow pinch points: undersized culverts or bridge openings
- Locations of past claims
- Hotspots for flooding
- Major land use changes or areas for proposed major land use changes
- Key emergency routes overtopped during frequent flooding events
- Areas of significant erosion
- Areas of mitigation success



LFUCG Hazard Mitigation Plan Activities 2005

- Facilitate strengthening public emergency services, infrastructure, facilities and personnel to natural hazards
- Inform citizens about areas or circumstances susceptible to hazards and having a great potential for loss of human life during a natural hazard
- Minimize or prevent losses to facilities and infrastructure from natural hazards
- Provide information to the housing industry through publications and electronic resources about residential flood proofing etc.
- Implement acquisition program that targets environmentally safe land and land located in the flood plain
- Work to purchase and demolish flood prone structures that meet NFIP/CRS guidelines for repetitive loss
- Increase community's involvement in CRS program
- Increase public outreach and education with neighborhood groups, schools and the private sector regarding hazard awareness and mitigation

